EPA Region 7 TMDL Review

TMDL ID:	KS-KLR-04-251_39	**Waterbody ID:**	KS-KLR-04-251_78, KS-KLR-04-251_383, KS-KLR-04-251_406, and KS-KLR-04-251_39
Waterbody Name:	Mill Creek Watershed		
Tributary:	Little Mill Creek (78), Clear Creek (383), Hays Creek (406), and Mill Creek (39)		
Pollutant:	Biology: Impact on Expected Aquatic Life Support		
State:	KS	**HUC:**	10270104
BASIN:	Mill Creek (Shawnee) Sub Basin; Kansas/Lower Republican River Basin		
Submittal Date:	1/9/2007		
Approved:	Yes		

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

The TMDL for the Mill Creek Watershed was formally submitted by the Kansas Department of Health and Environment (KDHE) in a letter received by EPA on December 11, 2006. The public comments and KDHEs response to those comments were formally submitted by KDHE in a letter received by U.S. Environmental Protection Agency (EPA) on January 9, 2007. Revisions to the TMDL were addressed as a separate submittal received May 17, 2007.

The Mill Creek Watershed is a phase II TMDL. The original TMDLs were for Sediment Impact on Aquatic Life and Nutrients and Oxygen Demand Impact on Aquatic Life. They were approved by EPA January 26, 2000.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

This TMDL links the narrative standard with the macroinvertebrate biological index (MBI) and the ephemeroptera, plecoptera, trichoptera (EPT) index. All biological monitoring metrics scores were evaluated for Station 251 near Shawnee over the period of record (1985-2005). The total suspended solids (TSS) values in the samples immediately before the biological sampling are about three times larger for the poor MBIs than the good scores. The nitrogen data shows little difference between the two biotic conditions.

The loading capacity is identified as a load allocation (LA) of a 35% reduction in TSS from current averages, and a waste load allocations (WLAs) for Olathe Harold Street of TSS concentrations maintained under 45 mg/L, which should result in a fully supporting the expected aquatic life support use as indicated by MBI and EPT biological indices scores. Meeting these targets should result in attainment of water quality standards (WQS).

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

Designated Uses:

Expected Aquatic Life Support	Drinking Water Supply	Food Procurement	Groundwater Recharge
Irrigation Water	Industrial Water	Livestock Water	
Secondary Contact Recreation B	Primary Contact Recreation B and C		

Impaired Use: Expected Aquatic Life Support on segment 39

Water Quality Standard: Suspended solids - Narrative: Suspended solids added to surface waters by artificial sources shall not interfere with the behavior, reproduction, physical habitat or other factor related to the survival and propagation of aquatic or semi-aquatic or terrestrial wildlife. (KAR 28-16-28e(c)(2)(D)).

Nutrients – Narratives: The introduction of plant nutrients into streams, lakes or wetland from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the production of undesirable quantities or kinds of aquatic life (KAR 28-16-28e(c)(2)(A).

Desired endpoint: Average MBI values of 4.5 or less over 2006-2015.

Biology:
MBI score Fully Supporting $\leq$4.5
EPT score Fully Supporting = 13

The state deems these conditions as not complying with their narrative WQS. The State of Kansas does not have numeric criterion for TSS in their WQS. The river exceeded the narrative WQS which states that "water shall be free from" aesthetically objectionable conditions (KAR 28-16-28e(b)(1-8)).

Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The State of Kansas does not have numeric criterion for TSS in their WQS.

The target is based on an expressed link of TSS to the narrative WQS. Decreased solids loads should result in aquatic communities with larger proportions or their populations comprising pollution intolerant species, indicative of improved water quality.

The loading capacity is identified as a load allocation (LA) of a 35% reduction in TSS from current averages, and a waste load allocations (WLAs) for the Olathe Harold Street WWTF of TSS concentrations maintained under 45 mg/L, which should result in a fully supporting the expected aquatic life support use as indicated by MBI and EPT biological indices scores.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Land Use: The Mill Creek Watershed comprises about 27% residential land use and 38% of undeveloped land, including agricultural lands. There is a relatively high percentage of commercial land use (11%) for Johnson County watersheds and the percentage of impervious surface area is estimated to be 12%, a density that begins to impact streams negatively through reduction of baseflows and increases in peak discharges.

Contributing Runoff: Urban stormwater might be a major influence on the integrity of the stream, its habitat and the biological communities dwelling in Mill Creek. While the flows demonstrate some direct relation with drainage area, examination of the unit runoff for each of the stream segments shows increased runoff in the more developed watersheds with higher impervious areas. In particular, the tributaries of Mill Creek and the middle reach of Mill Creek see very large yields of runoff during 10- year flood events. The upper portion of Mill Creek appears similar to the less developed western county watersheds and the larger drainage area of the lowest portion of the creek tends to attenuate the peak runoff. It would appear the combination of smaller watersheds, higher densities of impervious surface and more extreme peak flow events leads to a marked increase in runoff and peak discharge, both of which will disrupt the physical and biological characteristics of Mill Creek, through high shearing velocities and sediment delivery and transport.

NPDES: There is currently one NPDES permitted wastewater discharger located within the watershed. The Olathe Harold Street wastewater plant is located in the upper reaches of the watershed. Its current permit (NPDES # KS 0045802; Kansas # M-KS52-IO01), effective through August 31, 2011, has typical permit limits for BOD and TSS of 45 mg/l averaged weekly and 30 mg/l on a monthly average. The trickling filter plant nitrifies its effluent, resulting in low ammonia levels, but elevated nitrate. Total phosphorus is also elevated relative to ambient stream concentrations. The proportion of Mill Creek flow attributed to discharge from the Harold Street Plant is approximately 20%. Similarly, nitrogen and phosphorus concentrations decrease markedly between the wastewater plant outfall and monitoring station 251.

All sources for biology have been considered.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

Cause and effect relationships between typical pollutants and the measures of biological integrity on Mill Creek are not well defined, although there is some suggestion that elevated BOD and TSS levels are associated with the lower biological indicators. With the uncertainty in causal factors, the initial emphasis of the TMDL will be to decrease suspended solid loading, particularly that is delivered through urban stormwater.

The relative presence of point and non-point activities has to be used to assess the relative contributions and responsibilities for nutrient load reduction in the watershed. Therefore, allocations are made for this TMDL in a general sense to direct appropriate action, assuming that Best Management Practices for urban stormwater will yield improved MBI values.

WLA Comment

Olathe Harold Street WWTF; limit of TSS and BOD $\leq$18 mg/L resulting in TSS and BOD WLAs of 800 lbs/day and a limit of TP 1.5 mg/L annual average resulting in TP WLA of 40 lbs/day.

The MS4 permit has a TSS and TP WLA ranging from very low flow (90%) to very high flow (10%), at normal conditions (50% or median flow) the TSS WLA is 1010 lbs/day and the TP WLA is 20 lbs/day.

The January 26, 2000 TMDLs gave WLAs of: At this point, the WLA will be a reduction of BOD loadings from point sources such that monthly average BOD concentrations are maintained below 18 mg/l, leading to instream concentrations of DO remaining above 5 mg/l at flows below 35 cfs. The sporadic occurrence of partial support conditions, indicated by MBI values over 4.5, seems to indicate a lack of consistent loading from the upper drainage.

LA Comment

The LA is set at a 35% reduction in TSS from current averages resulting in an LA ranging from very low flow (90%) to very high flow (10%), at normal conditions (50% or median flow) the TSS LA is 1515 lbs/day and the TP LA is 30 lbs/day.

The January 26, 2000 TMDLs gave LAs of: At this point, the LA will be a reduction of sediment loadings so average TSS concentrations are below 100 mg/L in stream a majority of the time.

At this point, the LA will be a reduction of nutrient loadings such that average phosphorus concentrations are below 100 ppb in stream and nitrate concentrations average below 200 ppb.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The MOS is implicit. Given the uncertain nature of load reduction for TSS and other factors that might influence the condition of the biologic community in Mill Creek, the MOS will use the proportion of EPT taxa found in Mill Creek to be over 13 while MBI values suggest full aquatic life support (MBI = 4.5 or lower) will be achieved. This MOS assures that the majority of aquatic macroinvertebrate population found in the stream is composed of pollution intolerant taxa and indicative of a high quality biologic community.

The January 26, 2000 TMDLs gave a MOS of: Given the variable nature of the MBI values seen on this stream, additional biological measures are necessary to assure indications of good aquatic community health. Therefore, the defined MOS for this TMDL will be a proportion of EPT individuals making up at least 55% of the sample population when MBI values are 4.5 or lower. This will ensure that the majority of aquatic macroinvertebrate population is composed of pollution intolerant taxa.

In order to ensure that biological data collected in 2004-2008 are not skewed by a single sample with a high proportion of EPT taxa, the defined MOS will be a median value of EPT taxa percentages among samples taken over 2004 - 2008 which must exceed 25%. As an additional assurance of full support of the aquatic life use, the median percentage of individuals in a sample which are EPT taxa must exceed 20%.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

Sampling occurs during open water season (April to November) within aquatic stage of the life cycle of the macroinvertebrates. There are no described seasonal variations of the desired endpoint of this TMDL. All flow conditions including seasonal variation are taken into account for TMDL calculations. The targets should result in WQS attainment regardless of the season.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

Public Notice: Public notification of the second round of TMDLs in the Kansas-Lower Republican Basin was made in the Kansas Register in January 5, 2006. An Internet Web site was established at http://www.kdheks.gov/tmdl/ to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Kansas-Lower Republican Basin.

Public Hearing: Public Hearings on the second round of TMDLs for the Kansas-Lower Republican Basin were held in Olathe on January 19, and in Topeka on January 30, 2006.

Basin Advisory Committee: The Kansas-Lower Republican Basin Advisory Committee met to discuss the second round of TMDLs in the basin on April 7, 2005 in Lawrence, July 26, 2005 in Concordia, October 20, 2005 in Lawrence and January 24, 2006 in Topeka.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

Johnson County is working with USGS to establish a baseline of biological and chemical quality in the streams within the county, including Mill Creek. The results of that study should be available after 2010 to assess the degree of support for aquatic life in the stream. KDHE will continue to collect seasonal biological samples from Mill Creek after 2010 to evaluate achievement of the desired endpoint.

Periodic monitoring of TSS in wastewater discharged from the Olathe Harold Street wastewater treatment plant will be expected under reissued NPDES and state permits.

KDHE will maintain its schedule of bimonthly monitoring at Station 251 throughout the time this TMDL remains in force.

Reasonable assurance

Reasonable assurance only applies when reductions in nonpoint source loading is required to meet the prescribed waste load allocations.

For the one point source in the watershed, the WLA assigned should be sufficient. Therefore, reasonable assurances are not required. Reasonable assurance, although not required, also includes numerous authorities and funding through the Kansas Water Plan.